EMINENT AMERICAN GEOLOGISTS.

CAPTAIN J. L. MORRIS.

Geology is the science which investigates the history of the earth. Its object is to trace the progress of our planet from the earliest beginnings of its separate existence through its various stages of growth, down to the present condition of things. It seeks to determine the manner in which the evolution of the earth's great surface features has been effected. It unravels the complicated process by which each continent has been built up. It follows, even into detail, the varied sculpture of mountain and valley, crag and ravine, nor does it confine itself merely to changes in the inorganic world. Geology shows that the present races of plants and animals are the descendants of other and different races which once peopled the earth. It teaches that there has been a progress of the inhabitants as well as one of the globe on which they dwelt. That each successive period in the earth's history since the introduction of living things has been worked by characteristic types of the animal and vegetable kingdoms, and that however imperfectly they have been preserved or may be deciphered, materials exist for a history of life upon the planet. The geographical distribution of existing faunas and floras is often made clear and intelligible by geological evidence, and in the same way light is thrown upon some of the remote phases in the history of man himself. A subject so comprehensive as this requires a wide and varied basis of evidence. It is one of the characteristics of geology to gather evidence from sources which at first sight seem far removed from its scope and to seek aid from almost every branch of science. Thus, in dealing with the earliest conditions of the planet, the geologist must fully avail himself of the labors of the astronomer. Whatever is ascertained by telescope, spectroscope, or chemical analysis regarding the condition of other heavenly bodies has a geological bearing. The experiments undertaken to determine conditions of matter and of energy may sometimes be taken as the starting points of geological investigations. The work of the chemical laboratory forms the foundation of a vast and increasing mass of geological inquiry. To the botanist, the zoologist,

CAPT. J. L. MORRIS

even to the unscientific, if observant traveler, by land or sea, the geologist turns for information and assistance. But while thus culling freely from the dominions of other sciences, geology claims as its territory the rocky framework of the globe. In the materials comprising that framework, their composition and arrangement, the processes of their formation the changes which they have undergone, and the terrestrial revolution to which they bear witness, lie the main data of geological history. It is the task of the geologist to grasp these elements in such a way that they may be made to yield up their evidence as to the march of events in the evolution of the planet. He finds that they have in large measure arranged themselves in chronological sequence, the oldest at the bottom and the newest at the top. Relics of an ancient sea-floor are overlaid by traces of a vanished land-surface, these are in turn covered by the deposits of a former lake, above which once more appear proofs of the return of the sea. Among these rocky records lie the lavas and ashes of long extinct volcanoes. The ripple left upon the shore, the cracks formed by the sun's heat upon the bottom of a dried-up pool, the very imprint of the drops of a passing rain-shower have all been accurately preserved and yield their evidence as to geographical conditions widely different from those which exist where such workings are now found.

Our subject proper is "American Geologists" and not "Geology." Edward Hitchcock, an American Geologist, was born of poor parents at Deerfield, Mass., May 24th, 1793. He owed his education chiefly to his own exertions, and was preparing himself to enter Harvard College when he was compelled to interrupt his studies from a weakness in his eye-sight. In 1815 he became principal of the academy of his native town, but he resigned his office in 1818 in order to study for the ministry. Having been ordained in 1821 pastor of the Congregational Church of Conway, Mass., he employed his leisure hours in making a scientific survey of the western counties of the state. In 1825 he resigned his charge in order to become Professor of Chemistry and Natural History in the newly founded Amherst College, an institution which owed its early success, if not its continued existence to his energetic efforts, both in rescuing it from financial difficulties and in increasing its literary and scientific efficiency. More especially did he render it invaluable service during the period when he was President, from 1844 to 1854. In 1830 he was apopinted State Geologist of Massachusetts, and in 1836 to the same office in connection with the first district of New York. On resigning the Presidency of

Amherst College, he was induced to retain his professorship. In 1836 he received the degree of LL. D from Harvard and in 1846 that of D. D. from Middlebury College. Besides his constant labors in geology, botany and zoology, Hitchcock took an active interest in agriculture, and in 1850 he was sent by the Massachusetts Legislature to examine into the methods of the agricultural schools of Europe. In geology his most inportant achievement was the examination and exposition of the fossil foot-prints of the Connecticut Valley. The collection he accumulated in connection with his investigations is contained in the Hitchcock Ichmological Museum of Amherst College. As a writer on geological science he was mainly concerned in determining the connection between it and religion, and employing its results to explain and support what he regarded as truths of revelation. He died at Amherst February 27th 1864.

Another American Geologist of note was Ferdinand Vandeveen Hayden. Born 1829, died 1887. In 1853 he explored the Bad Lands of Dakota and in 1854-55-56 was in the basin of the upper Missouri. From 1859 to 1862 he was naturalist and surgeon to the expedition sent out to explore the Yellowstone and Missouri rivers, under Captain W. F. Raynolds, and in the latter year became the assistant surgeon of volunteers in the U. S. army. In 1863 he was promoted full surgeon and in 1865 resigned with the brevet of Lieutenant Colonel. From 1865 to 1872 he was professor of Mineralogy and Geology in the University of Pennsylvania. He then became connected again with the government geological surveys and remained in charge of the Montana division until 1886 when failing health compelled him to resign. He was the author of numerous scientific papers and government reports.

James Dwight Dana, one of the greatest American geologists was born at Utica, New York, on February 12th, 1813. He graduated at Yale College in 1833 and was a teacher of mathematics at the U. S. Naval Academy from 1833 to 1835. In 1836 he was assistant to Professor Silliman in chemistry and geology at Yale College. In December 1836 he was appointed mineralogist and geologist to the U. S. exploring expedition under Commodore Wilkes and accompanied it during its whole tour, returning home in 1842. In 1837 he published his work on mineralogy which has since passed through many editions and to which three appendices have been added in separate volumes, bringing the work down to 1882. Since 1846 Prof. Dana has been one of the editors of the American Journal of Science. He prepared three voluminous reports of his observations made

during the expedition with accompanying atlases of figures describing many new species of geological formations which he had observed. In 1855 he became professor of Natural History and Geology in Yale College a position which he still holds. He is a fellow of the Royal Society, London, Member of the French Academy, Paris and of other learned societies of Europe. In 1872 he received the Wolloster gold medal of the geological society of London and in 1879 the Copley medal of the Royal Society.

Alexander Wincholl was born at Northeast Duchess county, New York, December 31st, 1824, and died at Ann Arbor, Mich., Feb. 19th, 1891. He was a graduate of the Wesleyan University, Middletown, Conn., having graduated there in 1847. He taught natural science in several schools. In 1854 he was called to the chair of physics and civil engineering in the University of Michigan, and a year later was transferred to the chair of geology, zoology and botany there which he held until 1873. After teaching for some time in the Syracuse University, New York, and in the Vanderbilt University, Tenn., he was in 1879 recalled to the University of Michigan and assumed the chair of geology and paleontology there, which he retained up to 1888. Among his writings the best known are "The Doctrine of Evolution," "Reconciliation of Science and Religion," and "Pre-Adamites."

Upon reviewing my paper I find a good many names and yet not one but was or is an eminent geologist, and there are a few more to follow. John Wesley Powell was born at Mount Morris, New York, in 1834. He studied at Oberlin; traveled in the West; lost an arm in the Union army; began in 1867 a scientific exploration of Colorado; became director of the U. S. Geological Survey in 1881; and president of the American Association for the Advancement of science in 1887. His writings are numerous and are regarded as standard and exhaustive on the subjects whereof they treat.

John Strong Newberry, an American geologist who made himself famous, was born at Windsor, Conn., in 1822. After studying medicine at the Cleveland Medical College and traveling in Europe he settled as a physician at Cleveland, Ohio, in 1851, where he remained until 1855. In the latter year he joined an expedition for exploring the country between Columbia river and San Francisco. He also joined Lieut. Ives in 1857 in the exploration and navigation of the Colorado river, spending nearly a year in exploring the great canyon. The summer of 1859 he spent traveling over southern Colorado, Utah, northern Arizona, and New Mexico, studying a large area of country

that was before unknown. In 1861 Dr. Newberry became a member of the United States Sanitary Commission. He had charge of all the work of this commission in the Mississippi Valley. After the war he was made paleontologist of the U. S. geological survey. As a geologist he occupies one of the foremost places. His publications include several works on geology and paleontology.

Ebenezer Baldwin Andrews, an eminent American geologist was born in Connecticut in 1821 and died in 1880. His literary works are mostly geological.

Last, but not least we come to our own Prof. Orton. The prominence the Ohio State University has attained among the colleges and universities of this country is worthy of more than passing comment, and perhaps can better be attributed to the efforts of no one individual, but rather to the energy and capacity that have characterized the men who have been at the head of its affairs since its inception, but if one looks over the lists of those who had helped on the University in its wonderful growth, and to whom are directly due the success of the Institution, there is no name that stands out more prominently than the name of Edward Orton. He was the first President of the Ohio State University; he has been since the chair was first instituted and still is, the professor of geology. As a savant and writer upon scientific subjects, he is not excelled in the state and in his chosen field of work to which he has devoted the major portion of his life, he occupies a position that is destined to make his name live in the annals of geological research. As a man he is all that the word could imply, as a teacher he has the hearts of all who have come under his instructions; as a friend none have ever had cause to complain of his unwillingness to share in the joys and sorrows of those who have a claim upon his heart. It would take more space than is available at the present time to give even a limited sketch of Dr. Orton's carreer, and I only propose to outline, perhaps faintly, the achievements and to show, if possible the characteristics of the man, the aphorism, that a prophet is not without honor save in his own country, does not find an illustration in Dr. Orton, though doubtless there have been fewer honors heaped upon him than he deserved. He was born in New York state on March 9th, 1829, his parents being Rev. Samuel G. and Clara Orton. The Orton family traces its ancestry back to about 1613 and members of it attained some note as patriots during the Revolution. Edward Orton spent the days of his childhood and early boyhood at Ripley, Chautauqua county, New York, where he drew the

inspiration of his latter years from the quiet pastoral scenes of farm life and imbibed that love of the earth which has been the guiding influence of his life. He was never an idler and learned the practical lessons of the soil by the commonplace following of the plow and the watching and assisting the varied processes of nature. Entering Hamilton College in 1845 as a sophomore he was graduated in 1848. Though at this time only 18 years of age he had already acquired an overwhelming desire for knowledge. During the summer that followed his graduation from college he walked along the shore of Lake Chautauqua where now thousands assemble yearly to spread the gospel of enlightenment. One time he only met one person in half a day but the solitude was more welcome, as it gave him an opportunity to observe the grand works of nature and to study the plan of creation, a line he has preserved more thoroughly since that time. In 1849 he entered Lane Theological Seminary at Cincinnati where he studied under the famous Dr. Lyman Beecher, but was compelled to give up his books on account of a temporary failure of his sight. For a short period he worked on the farm taking a number of trips on foot through the surrounding country. He resumed the work of teaching when the recovery from the weakness of his eyes allowed him to become a member of the faculty of the Delaware Institute at Franklin, New York. His mind up to this time had been largely of a literary and classical turn, but being appointed as instructor in natural sciences it took a different bent. He developed a taste for chemistry, botany, geology and other kindred studies which were doubtless latent, and needed but the inspiration of work in their direction to cause them to take the chief place in his thoughts. He delved into the mysteries of these sciences with an energy born of determination to master them and with a special intention of preparing himself more fitly to teach them. He took a six months course in the Lawrence Scientific school of Harvard University where he listened to the lectures of the celebrated Professors Horsford, Cook and Gray, the first named became the millionaire proprietor of a brand of baking powder, the advertising of which has made his name known all over the world. Dr. Orton attended Andover Seminary for a year where he studied theology and in 1856 he was called to the chair of natural sciences at Albany, New York, which position he held until he resigned it to take charge of Chester Academy in Orange County, New York. He spent six years at the head of the school leaving it to accept the principalship of the preparatory department of Antioch College at Yellow Springs, O. He became in turn a professor of natural science and in 1872 the

president of this institution. In 1873 He became identified with the Ohio Agricultural and Mechanical College, now the State University. The history of the University since that time is a record of Prof. Orton's career. Accepting the presidency in April 1873 he labored indefatigably for the success of the institution and met with a response to his efforts the measure of which may be judged by the present status of the university. In 1881 he resigned the presidency, still retaining the chair of geology and in 1882 was appointed State Geologist and in just recognition of his eminent services the board conferred upon him the degree of LL. D. Prof . Orton had published numerous pamphlets on scientific subjects and for many years has been esteemed an authority on all branches that he has essayed to master. In seven large volumes he has covered the whole field of geology and they stand to-day as the best treatises of their kind in the United States. In the Eighth Annual Report of the United States Geological Survey was published a paper upon the Trenton Limestone as a source of natural gas and petroleum in Ohio and Indiana covering 58 pages of the large quarto volume. In this he predicted the duration of the supply of gas in certain districts (then spoken of as everlasting sources) and said that a single digit would cover its further duration in years. Within three or four years he saw his predictions realized exactly as he had foretold and of the reasons assigned by him. The gas failed and he was recognized as having a more intimate acquaintance with the causes and phases of the coal and petroleum supply than any other scientist.

Orton Hall, which is the Geological Museum and Library of the Ohio State University, a magnificent stone building costing $100.000 is a fitting monument to the man for whom it was named. The building was his conception. His idea was to provide for the present needs and future growth of the university and for the proper representation of the geology of the State. The building is typical of the science which it perpetuates.

The foundation stones are built on layers showing the strata of Ohio Rock formation from the lowest to the highest in regular order. In the vestibule there are 24 columns, each of a different native Ohio stone, the wainscoting being of verim lime stones. The carving of the capitals of the columns shows the abandonment of conventional foilage, the artist having woven in copies of delicate shells found in the fossil formations of the state, as well as birds, fishes and other representation of organic life.

In 1892 he had a stroke of paralysis but has regained much of his vigor again.

In closing this random sketch of Dr. Orton, it might not be out of place to quote a sentance spoken by him on the 25th anniversary of the Ohio State University: "Men often build better than they know." He has built upon rock. He has the love of all who know him and the respect and esteem of the world.

The reading of Captain Morris's paper was greeted with loud applause, particularly that part of it relating to Dr. Orton.

PRESIDENT RAY: I think I speak the sentiment of the Institute when I say that I have enjoyed this paper the best of any I ever heard the Captain read, and he is one of the large contributors, too. Is there any discussion of the subject? If there is none, we will next take up miscellaneous business, and under this head we will consider the election of officers for the ensuing year and those other points suggested in my paper.

Upon motion a vote of thanks was tendered Captain Morris for his paper, and the remarks concerning Dr. Orton contained therein endorsed as expressing the unanimous sentiment of the Institute.

Upon motion of Mr. Oyser, a committee of three was appointed to nominate officers for the following year, the following being named by the chair: Messrs. Llewellyn, Love and Lord.

PRESIDENT RAY: I would like to hear the matter of publication of the journal discussed.

PROFESSOR LORD: I would like to ask the Secretary what are his wishes on the subject, — if he would like to have a committee appointed for conference, or raise funds, or formulate plan?

SECRETARY HASELTINE: I had thought first to attempt to secure positive assurances of aid enough to guarantee the publication of the Journal. I have thought also of asking 25 or 30 of the members of the Institute to join in a guarantee fund to help pull through in case we should be short, until it could be collected from dues that are accruing, similar to the fund asked to secure the steamer on last summer's excursion. Mem-

bers promptly responded and I had guarantees for more than was needed, but as it proved I didn't need any of it. I still hope that I will be able to get sufficient advertisements, with the dues that can be collected, to publish the Journal and then by distribution to be able to collect the back dues.

PRESIDENT RAY: It might be a good plan to have a committe appointed to look over the matter anyway, and if any improvement or better way can be suggested, so much the better.

SECRETARY HASELTINE: I will be glad to have all the help I can get.

PROFESSOR LORD: We ask members to contribute papers and have in response valuable papers. As a rule, when a man reads a paper before the Institute, he prepares it with sufficient care and work of such a character that he feels entitled to a large audience. We have 130 odd members, and perhaps 25 per cent. will be present at a meeting. His paper is prepared for the Institute and he feels that all should see it, not to speak of those outside. I feel that we would meet with a wider response to our appeal for papers if we can make arrangements for the Journal to be published periodically. It cannot be done without money, and it strikes me that the serious problem is to devise means by which a regular publication can be maintained. It also strikes me that it is throwing a great deal of work on the Secretary, asking him to publish the Journal without money, — like making bricks without straw.

HENRY LAVIERS: All branches of business are recovering from the depression of the last year or two and all are trying to recover from the deficiency of that time. This idea has struck me this afternoon: Each operator has seven or eight mine bosses, and maybe not one belongs to the Institute. What would be the matter of our Secretary corresponding with the operators of the mines of Ohio, stating the condition we are in and what material we have on hand which we are unable to give to the public; stating that it might be valuable food for their mine bosses and give them ideas whereby they might save

money for their employers. If we could get five or ten dollars from each one of the operators of the state, promising to advance a copy of the Journal for each mine boss, it would let us out. The operators are generally wide awake and want men who can produce coal the cheapest, men who can attack the problems that come up and overcome them. The papers which come up before the Institute would enable the mine boss to broaden his mind.

SECRETARY HASELTINE: A dollar from each bank boss in Ohio who employs ten men would bring $425.

PRESIDENT RAY: I would like to see Prof. Lord's views put into the form of a motion, if it does not conflict with those of the Secretary.

SECRETARY HASELTINE: No, I am in favor of it.

PROFESSOR LORD: The matter has been brought before the Institue. Let it stay awhile and let the members think it over. If you appoint a committee, they will think it is the committee's business and stop thinking. Better all think about it, because each one might be on the committee.

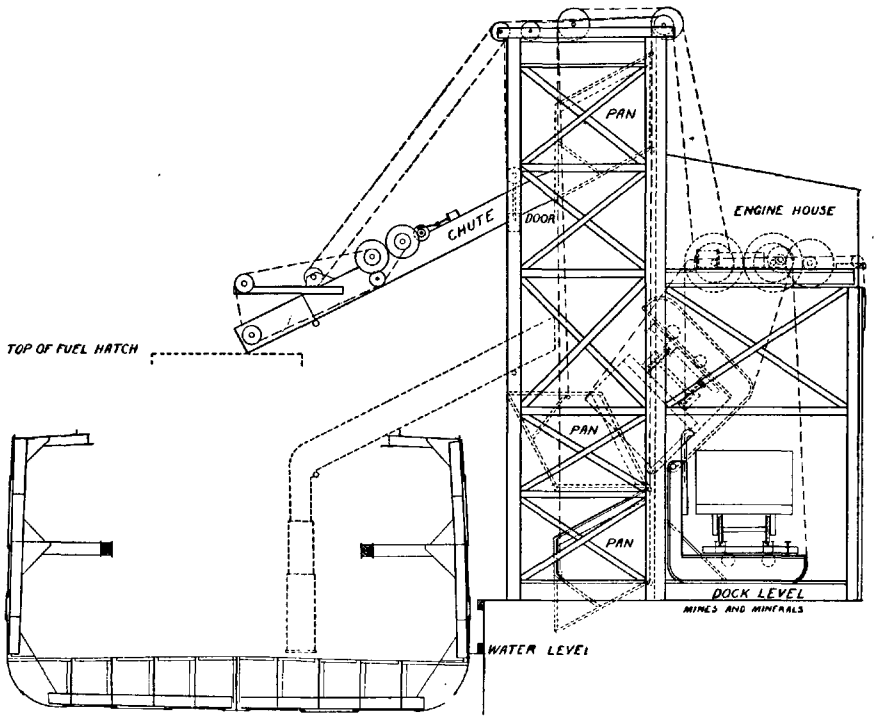
PRESIDENT RAY: What is your pleasure in regard to discussing coal wastage? Is there any report from the committee on Wastage of Coal.

MR. JENNINGS: Last year we made a request to be discharged and the whole matter was left with the mine inspector and his assistants. There has been no meeting called, nor any meeting of the committee held this year. The last I knew, I met President Ray on the street and he said we ought to get together and form some questions which the inspectors should ask and collect information from the mines. He said we would go down to the Mine Inspector's office and see Haseltine. That was nine months ago and I have been waiting for that time ever since. All the Committee was to do was to put in shape the information gathered by the mine inspectors and go before the legislature. We have no further information than we had last year.

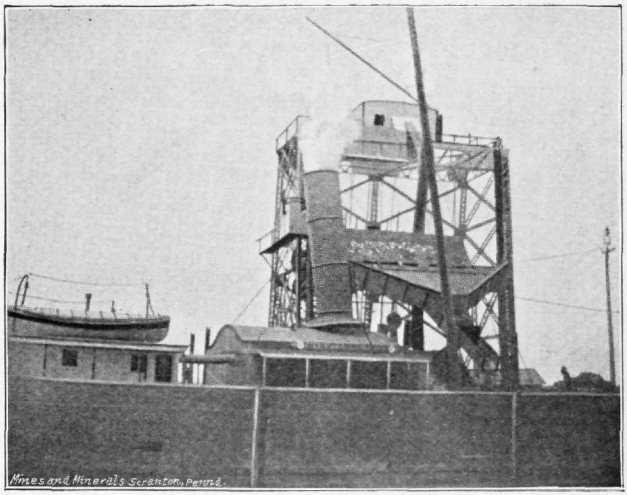
SECRETARY HASELTINE: That is where we are lame, — we ought to have the Journal to read that resolution from. I remember that the mine inspectors were to assist this committee in securing such information as they desired, and as they travel over their districts they could collect that information without expense to the committee. I was not aware that they were entrusted with the work that was assigned to the committee appointed with so much care by our President two years ago. But that is not profitable to discuss now. The waste of the coal is going on with the same force that it was at the time the matter was brought up. I do not think there has been any change at all, though some efforts have been made in the way of experimenting with a view of economy.

The Institute is in good position to bring that matter before the General Assembly now. One of our members is a member of the committee of mines and mining. The chairman of that committee lives in a county where the wastage of coal is simply enormous, and I think there are a number of well informed people upon that committee this year. There is abundance of time to accomplish something, if we take it up right now. We can have an investigation provided for and bring the matter to the public generally for their approval or disapproval. I am confident if the people of Ohio, and perhaps the mine owners themselves were aware of the wastage of their property, the depreciation of their investment by the mode of mining in vogue in many portions of the state, they would join in an active movement to have it remedied. An agitation of the subject can certainly do no harm.

PRESIDENT RAY: I will say in reply to Mr. Jennings' remark, that the committee undertook, after the failure of the Van Pelt bill to carry on this work by correspondence, and from his report a year ago, I for one understood that this was generally considered a failure as a manner of gaining information. The reason for my desire to have the committee continued was to keep alive an interest in the subject, not to expect them to act individually on account of the expense, but to be ready to present the matter to the legislature and



McMYLER SIDE DUMP. 1898 DESIGN.



McMYLER SIDE DUMP. 1895 DESIGN.
Cuddy-Mullin Dock.

McMYLER SIDE DUMP—END VIEW. 1895 DESIGN.
Cuddy-Mullin.

renew the effort to get legislation similar to that contemplated by the Van Pelt Bill. The committee was a well chosen one, the selection having been made by Secretary Haseltine, certain other members and myself, and it is in existence until discharged. I would like to see the committee continued with instructions to renew the effort of two years ago. Any further discussion of this matter?

MR. LOVE: Mr. Chairman, I was well aware that the matter was left largely with the mine inspectors. I am a member of the committee and also one of the inspectors. The same wastage is going on, though I have made closer observation and think the per cent. is even greater than the committee anticipated. I find that what has been said here with regard to long wall work and the appointment of this committee has done some good in that different members of the Institute are beginning to think of more economical methods of mining coal. So far as the present committee is concerned, they can do some good by going before the Committee on Mines and Mining and having some action taken there, and I am willing, if necessary, to submit a motion of that kind. I would rather somebody else were on that committee, but it will save the appointing of a new committee to let it stand. I move that that committee serve until they present the matter in a proper way to the Committee on Mines and Mining.

CAPTAIN MORRIS: I second that motion, and it ought to be done at an early date. The session is well commenced and the matter ought to be agitated while we are here now.

On being put to vote, motion carried.

PROFESSOR LORD: I have a resolution to offer. Our Poet Laureate has as usual been profitably employed during the year and has a poem in his possession, the reading of which I would like to have made a special order of business for to-morrow afternoon, at the close of the session.

Seconded; carried.

PRESIDENT RAY: If there is no further business for discussion, our friend Mr. Oyser will entertain us with some music from the Graphaphone with Echo improvement of his own.

After a very enjoyable half hour spent in listening to the Graphaphone concert furnished by Mr. Oyser, meeting adjourned.

AFTERNOON SESSION—JANUARY 19, 7:30 P. M.

PRESIDENT RAY: The Institute will please come to order. It will be necessary for us to change the program a little tonight, as we have several numbers not on the printed program.

We have some interesting snap shots taken on our excursion last summer, and also the slides used by Mr. Hanlon at the Pittsburgh meeting, and as they are illustrative of Mr. Hanlon's paper to a certain extent, we will listen to Mr. Hanlon's paper, see the pictures and listen to music furnished by Mr. Oyser in between.